Claims

[c1] 1. A gearbox (1) for motor vehicles, intended to be connected to the output side of a basic gearbox and comprising an input shaft (2) from the basic gearbox, an output shaft (3) to a transmission, a planetary gear (4) arranged between the input shaft (2) and the output shaft (3), a ring gear (18) of the planetary gear is axially displaceable by a first member (27), a first coupling ring (10) that engages a high-range mode, and a second coupling ring (16) that engages a low-range mode, the coupling rings (10, 16) and the ring gear (18) alternatively engage at least one synchronizing member (15) with at least one friction surface (14, 22), which synchronizing member (15) is configured to synchronize the rotational speed difference between the ring gear (18) and one of the coupling rings (10, 16) by interaction with a corresponding friction surface (13, 23) arranged on each coupling ring (10, 16), the synchronizing member (15) and the second coupling ring (16) are coaxially arranged outside the ring gear (18), a second engagement member (25) configured to engage at least the second coupling ring (16) and a third engagement member (25, 25b) configured to drive said synchronizing member (15) are arranged on a radially external side of the ring gear (18), and the second coupling ring (16) is arranged between the synchronizing member (15) and the first member (27).

[c2] 2. The gearbox as recited in claim 1, wherein the second engagement member (25) is engageable with the first coupling ring (10).

[c3] 3. The gearbox as recited in claim 1, wherein at least one internal bar is radially arranged on an internal side of the ring gear (18) and corresponding coupling teeth on the first coupling ring (10) are arranged

on a radially external side of the first coupling ring (10).

[c4] 4. The gearbox as recited in claim 3, wherein said internal bars in the ring gear (18) constitute some of the internal teeth (19) of the ring gear (18) and which interact with planet wheels (7) forming part of the planetary gear.

[c5] 5. The gearbox as recited in claim 1, wherein the second engagement member (25) and the third engagement member (25, 25b) constitute a combined fourth member (25, 25b) that drives said synchronizing member (15) and engages at least one of the coupling rings (10, 16).

[c6] 6. The gearbox as recited in claim 5, wherein bars (25, 25b) constitute at least one of: the second means (25), and the third means (25, 25b) and the fourth means (25, 25b).

[c7] 7. The gearbox as recited in claim 1, wherein at least one synchronizing ring (15) constitutes the synchronizing member (15).

[c8] 8. The gearbox as recited in claim 7, wherein the synchronizing rings (15) are assembled into a double synchronizing ring (15) engageable with the two coupling rings (10, 16).

[c9] 9. The gearbox as recited in claim 1, wherein the ring gear (18) has at least one first circumferential groove (20) on a radially external side thereof.

[c10] 10. The gearbox as recited in claim 9, wherein the ring gear (18) has at least one second circumferential groove (30) on the radially external side thereof.

[c11] 11. The gearbox as recited in claim 10, wherein an essentially annular,

radially resilient element (21) is arranged in at least on of the first (20) and second (30) grooves and which is moveable into and out of the respective groove (20, 30) when the ring gear (18) is displaced axially relative to the synchronizing member (15).

[c12] 12. The gearbox as recited in claim 11, wherein the element (21) is an annular spring (21) which has an interruption in its circumferential direction.

[c13] 13. The gearbox as recited in claim 1, wherein blocking surfaces (28, 29) are arranged on the synchronizing member (15) and configured to block engagement of said coupling rings (10, 16) and the ring gear (18) before synchronous rotational speed is achieved.

[c14] 14. The gearbox as recited in claim 1, wherein internal teeth (19) of the ring gear (18) are angled in a tangential plane in relation to the axial centerline (32) of the ring gear (18) and is configured to bring about a servo effect upon axial movement of the ring gear (18), and in that said angling induces counterclockwise displacement with increasing distance from one shaft end of the gearwheel (18).

[c15] 15. The gearbox as recited in claim 14, wherein said bars (25) arranged on the external side of the ring gear (18) and coupling teeth (31) also arranged on the coupling ring (16) are angled in the tangential plane in relation to the axial centerline (32) of the ring gear (18) and are configured to balance axial force acting on the ring gear when the internal teeth of the ring gear are angled.